

WHAT IS CLAIMED IS:

1. A method for improving performance of an electrophoretic display, which method comprises adding a high absorbance dye or pigment to at least one of the electrode protecting layers in the display.

5 2. The method of Claim 1 wherein said dye or pigment has an absorption band in the range of about 320 to about 800 nm.

3. The method of Claim 2 wherein said dye or pigment has an absorption band in the range of about 400 to about 700 nm.

10 4. The method of Claim 1 wherein said dye or pigment is selected from the group consisting of metal phthalocyanine or naphthalocyanines, metal porphines, azo, squaraine, perylene and croconine dyes.

5. The method of Claim 4 wherein said metal in metal phthalocyanine or naphthalocyanines is Cu, Al, Ti, Fe, Zn, Co, Cd, Mg, Sn, Ni, In, Ti, V or Pb.

6. The method of Claim 4 wherein said metal in metal porphines is Co, Ni or V.

15 7. The method of Claim 4 wherein said azo dye is a diazo or polyazo dye.

8. The method of Claim 1 wherein said dye or pigment is a charge generating material used in organic photoconductors.

20 9. The method of Claim 1 wherein said dye or pigment is selected from the group consisting of Cu phthalocyanines, Cu naphthalocyanines C.I. Solvent Blue 67, Ni phthalocyanine, Ti phthalocyanine, Ni tetraphenylporphine, Co phthalocyanine, ORASOLTM Blue GL, ORASOLTM Red BL, ORASOLTM Yellow 2GLN, ORASOLTM Black CN, ORASOLTM Black RL1, tetraphenylporphine vanadium(IV) oxide complex and their alkylated or alkoxylated derivatives, C.I. Solvent Black 29, Sudan Black B, Sudan Blue, Sudan R, Sudan Yellow, Sudan
25 I, Sudan II, Sudan III, Sudan IV, 1-(4-dimethylamino-phenyl)-3-(4-dimethylimmonium-

dimethylimmonium-cyclohexa-2,5-dien-1-ylidene)-2-oxo-cyclobuten-4-olate, 1-(4-methyl-2-morpholino-selenazo-5-yl)-3-(2,5-dihydro-4-methy-2[morpholin-1-ylidene-onium]-selenazo-5-ylidene)-2-oxo-cyclobuten-4-olate, 1-(2-dimethylamino-4-phenyl-thiazol-5-yl)-3-(2,5-dihydro-2-dimethylimmonium-4-phenyl)-thiazol-5-ylidene)-2-oxo-cyclobuten-4-olate; 2,9-di(hydroxyethyl)-anthra[2.1,9-def:6,5,10-d'e'f']diisoquinoline-1,3,8,10-tetrone, 9-di(2-methoxyethyl)-anthra[2.1,9-def:6,5,10-d'e'f']diisoquinoline-1,3,8,10-tetrone, bisimidazo[2,1-a:2',1'-a']anthra[2.1,9-def:6,5,10-d'e'f']diisoquinoline-dione and anthra[2'',1'',9'':4,5,6:6'',5'',10'':4',5',6']-diisoquinoline[2,1-a:2'1'-a]diperimidine-8,20-dione.

10. An electrode protecting layer composition comprising a high absorbance dye or pigment.

11. The composition of Claim 10 wherein said dye or pigment has an absorption band in the range of about 320 to about 800 nm.

12. The composition of Claim 11 wherein said dye or pigment has an absorption band in the range of about 400 to about 700 nm.

13. The composition of Claim 10 which is a primer layer composition comprising a thermoplastic, thermoset or a precursor thereof and a high absorbance dye or pigment.

14. The composition of Claim 13 wherein said thermoplastic, thermoset is selected from the group consisting of polyvinylbutyral, cellulose acetate butyrate, poly (alkyl acrylates), poly(alkyl methacrylates), polyethers, polyurethanes, polyamides, polyesters, polycarbonates, multifunctional acrylates or methacrylates, vinylbenzenes, vinylethers, epoxides and oligomers or polymers thereof.

15. The composition of Claim 10 which is a sealing layer composition comprising a sealing layer forming material and a high absorbance dye or pigment.

16. The composition of Claim 15 wherein said sealing layer forming material is selected from the group consisting of thermoplastic elastomers, polyvalent acrylate or

methacrylate, cyanoacrylates, polyvalent vinyl, polyvalent epoxide, polyvalent isocyanate, polyvalent allyl and oligomers or polymers containing crosslinkable functional groups.

17. The composition of Claim 10 which is an adhesive layer composition comprising an adhesive layer forming material and a high absorbance dye or pigment.

5 18. The composition of Claim 17 wherein said adhesive layer forming material is selected from the group consisting of acrylics, styrene-butadiene copolymers, styrene-butadiene-styrene block copolymers, styrene-isoprene-styrene block copolymers, polyvinylbutyral, cellulose acetate butyrate, polyvinylpyrrolidone, polyurethanes, polyamides, ethylene-vinylacetate copolymers, epoxides, multifunctional acrylates, vinyls, vinyl ethers and oligomers, polymers and
10 copolymers thereof.

19. The composition of Claim 10 wherein said dye or pigment is in the amount of from about 0.1 to about 30% by weight of the total solid content of the electrode protecting layer.

20. The composition of Claim 19 wherein said dye or pigment is in the amount of from about 2 to about 20% by weight of the total solid content of the electrode protecting layer.

15 21. An electrophoretic display which comprises at least one electrode protecting layer formed from a composition comprising a high absorbance dye or pigment.

22. A method for improving the performance of an electrophoretic display which method comprises adding a conductive filler in the form of nanoparticles and having a volume resistivity of less than about 10^4 ohm cm into a composition for the formation of an electrode
20 protecting layer.

23. The method of Claim 22 wherein said volume resistivity is about 10^2 to about 10^3 ohm cm.

24. The method of Claim 22 wherein the conductive filler has an average primary particle size which is smaller than the range of UV-visible scattering light.

25 25. The method of Claim 22 wherein the conductive filler has an average primary particle size in the range of about 5 to about 150 nanometer.

26. The method of Claim 25 wherein the conductive filler has an average primary particle size in the range of about 10 to about 50 nanometer.

27. The method of Claim 26 wherein the conductive filler has an average primary particle size in the range of about 15 to about 20 nanometer.

5 28. The method of Claim 22 wherein the conductive filler is selected from the group consisting of conductive metal oxide particles, carbon black, graphite, carbon nanotube, conductive polymers, metal particles or flakes and conductive nanoclusters.

29. The method of Claim 28 wherein said conductive polymer is polythiophene (PT), polyacetylene, polypyrrole (PPy) or polyaniline (PAN).

10 30. The method of Claim 28 wherein metal particles or flakes are silver particles or flakes.

31. The method of Claim 28 wherein conductive nanoclusters are Au or Cu nanoclusters.

15 32. The method of Claim 22 wherein said conductive filler is zinc antimonate, zinc sulfide, indium tin oxide or antimony tin oxide.

33. An electrode protecting layer composition which comprises a conductive filler in the form of nanoparticles and having a volume resistivity of less than about 10^4 ohm cm.

34. The composition of Claim 33 wherein the volume resistivity is about 10^2 to about 10^3 ohm cm.

20 35. The composition of Claim 33 which forms an electrode protecting layer having a volume resistivity in the range of about 10^7 to 10^{10} ohm cm.

36. The composition of Claim 33 the conductive filler has an average primary particle size which is smaller than the range of UV-visible scattering light.

25 37. The composition of Claim 33 wherein the primary conductive filler particles do not absorb light in the range of about 300 to about 700 nm.

38. The composition of Claim 33 wherein the conductive filler has an average primary particle size in the range of about 5 to about 150 nanometer.

39. The composition of Claim 38 wherein the conductive filler has an average primary particle size in the range of about 10 to about 50 nanometer.

40. The composition of Claim 39 wherein the conductive filler has an average primary particle size in the range of about 15 to about 20 nanometer.

41. The composition of Claim 33 wherein the conductive filler is selected from the group consisting of conductive metal oxide particles, carbon black, graphite, carbon nanotube, conductive polymers, metal particles or flakes and conductive nanoclusters.

42. The composition of Claim 41 wherein said conductive polymer is polythiophene (PT), polyacetylene, polypyrrole (PPy) or polyaniline (PAN).

43. The composition of Claim 41 wherein metal particles or flakes are silver particles or flakes.

44. The composition of Claim 41 wherein conductive nanoclusters are Au or Cu nanoclusters.

45. The composition of Claim 33 wherein said conductive filler is zinc antimonate, zinc sulfide, indium tin oxide or antimony tin oxide.

46. The composition of Claim 33 wherein said conductive filler is in a sol gel form.

47. The composition of Claim 46 wherein said sol gel comprises a solvent.

48. The composition of Claim 47 wherein said solvent is 2-butanone, acetone or isopropanol.

49. The composition of Claim 33 wherein said conductive filler is colorless and highly transparent.

50. The composition of Claim 49 wherein said conductive filler has about 75% to about 95% transmission in the visible light range for a 20 μm dried film containing about 30% by weight of the conductive filler.

51. The composition of Claim 50 wherein said conductive filler has about 85% to about 90% transmission in the visible light range for a 20 μm dried film containing about 30% by weight of the conductive filler.

52. The composition of Claim 33 wherein said conductive filler is zinc antimonate colloidal nanoparticles.

53. The composition of Claim 33 wherein said conductive filler has a concentration in the range of about 0.01 % to about 50% by weight of the total solid content.

54. The composition of Claim 53 wherein said conductive filler has a concentration in the range of about 15% to about 45% by weight of the total solid content.

55. An electrophoretic display which comprises at least one electrode protecting layer formed from a composition comprising an electrode protecting layer forming material and a
5 conductive filler in the form of nanoparticles and having a volume resistivity of less than about 10^4 ohm cm.

56. The electrophoretic display of Claim 55 wherein said electrode protecting layer is a primer layer and said electrode layer forming material is a thermoplastic, thermoset or a precursor thereof.

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